

From: Joel MOSKOWITZ <jmm@berkeley.edu>
Date: Mon, Sep 26, 2016 at 2:46 PM
Subject: 15 new studies on electromagnetic fields and biology or health
To: CHE-EMF <cheemf@lists.healthandenvironment.org>

A review on Electromagnetic fields (EMFs) and the reproductive system

Asghari A, Khaki AA, Rajabzadeh A, Khaki A. A review on Electromagnetic fields (EMFs) and the reproductive system. *Electron Physician*. 2016 Jul 25;8(7):2655-62. doi: 10.19082/2655. eCollection 2016.

Abstract

Environmental factors, such as electromagnetic waves, induce biological and genetic effects. One of the most important physiological systems involved with electromagnetic fields (EMFs) is the genital system. This paper reviews the effects of EMFs on human reproductive organs, female animals, fetus development and the importance of two types of natural antioxidants, i.e., vitamin E and fennel. The studies presented in this review referred to the effects of different exposures to EMFs on the reproductive system, and we tried to show the role of natural antioxidants in reducing the effects of the exposures. Many studies have been done on the effects of ionizing and non-ionizing electromagnetic waves on the cell line of spermatogenesis, sexual hormones, and the structure of the testes. Also, about the hormonal cycle, folliculogenesis and female infertility related to EMF have been given more consideration. In particular, attention is directed to pregnant women due to the importance of their fetuses. However, in addition to the studies conducted on animals, further epidemiological research should be conducted.

Conclusions

Many studies have shown that electromagnetic fields can have destructive effects on sex hormones, gonadal function, fetal development, and pregnancy. So people must be aware of the negative effects of EMFs. Although the impact of the waves varied at different frequencies, it is better to stay as far away as possible from their origin because of the risks associated with exposures to these waves. In addition, people can use natural antioxidants to help reduce the effects of these waves.

Open Access Paper: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5014506/>

--

Effects of electromagnetic fields emitted by GSM phones on working memory: a meta-analysis

Zubko O, Gould RL, Gay HC, Cox HJ, Coulson MC, Howard RJ. Effects of electromagnetic fields emitted by GSM phones on working memory: a meta-analysis. *Int J Geriatr Psychiatry*. 2016 Sep 20. doi: 10.1002/gps.4581. [Epub ahead of print]

Abstract

BACKGROUND AND OBJECTIVE: Current treatments for Alzheimer's Disease (AD) do not affect the course of the illness and brain stimulation techniques are increasingly promoted as potential therapeutic interventions for AD. This study reviews the effects of electromagnetic field (EMF) exposure versus sham exposure on working memory (WM) performance of healthy human participants.

METHOD: Online literature databases and previous systematic reviews were searched for studies of EMF and WM in participants without reported memory problems. Two thousand eight hundred and fifty seven studies

were identified, and 10 studies met the inclusion criteria. An assessment of study quality was completed, and separate, random effects meta-analyses were conducted for each of the three WM tasks included: n-back, substitution and digit span forward.

RESULTS: No differences were found between participants exposed to active EMF versus sham conditions in any of the three working memory tasks examined.

CONCLUSION: Results indicate that EMF does not affect WM during the n-back, substitution and digit-span tasks. Future studies should focus on the possible effects of chronic exposure to EMF in older adults with AD using a battery of comparable WM and attention tasks, before EMF can be seriously considered as a potential modulator of WM in AD.

<http://www.ncbi.nlm.nih.gov/pu/bmed/27645289?dopt=Abstract>

--

Exposure to Visible Light Emitted from Smartphones and Tablets Increases the Proliferation of *S. aureus*: Can this be Linked to Acne?

MJ Mortazavi, M Taheri, M Darabian, Izadbakhsh, F Nouri, Masoud Haghani, SAR Mortazavi, Ghazal Mortazavi, SMJ Mortazavi, M Moradi. Exposure to Visible Light Emitted from Smartphones and Tablets Increases the Proliferation of *S. aureus*: Can this be Linked to Acne? Journal of Biomedical Physics and Engineering (JBPE), in press. Published on September 24, 2016

Abstract

The exponential rise in the use of handheld devices such as smartphones and tablets has raised global concerns about the safety of these devices. Smartphones, tablets, laptops, and other LED screens can emit high levels of short-wavelength visible light (blue region in the light spectrum). Over the past several years, the biological effects of exposure to shortwavelength visible light emitted from smartphones and tablets on the eye and skin (premature skin aging) have been widely studied. However, to the best of our knowledge, the effect of exposure to light emitted from these devices on the proliferation of *Staphylococcus aureus* and the possible association of its exposure to light and acne pathogenesis has not been investigated yet. In this study, the effect of exposure to visible light emitted from the screens of a commercial smartphone (Sony Xperia) and a commercial tablet (Samsung Galaxy Note 10.1) on the growth rate of *Staphylococcus aureus* bacteria (ATCC No. 25923) is investigated. Some studies show that *Staphylococcus aureus* can intensify the symptoms in chronic inflammatory skin diseases. Acne vulgaris has been reported to be the most common human skin disorder. This skin disorder was reported to be persistent in 80% of the women (58% of these women had an ongoing need for treatment). All experiments were performed at 37°C in a separate incubator and bacteria were grown in 20 ml Brain Heart Infusion Broth (BHI) 10 cm plates. Then, in a dark environment, bacteria were exposed to the light of the smartphone and tablet at a distance of 2-3 mm (common distance between the smartphones and facial skin). The brightness of the displays of these devices was set at 50%. The control samples were exposed to the same intensity of light generated by a conventional incandescent light bulb. The growth rate of bacteria was examined by measuring the optical density (OD) at 625 nm (UNICO UV-2100 spectrophotometer) before the light exposure and after 30, 60, 90, 120, 150, 180, 210, 240, 300, and 330 minutes of light exposure. The growth rates of bacteria in both smartphone and tablet groups were higher than that of the control group and the maximum smartphone/control and tablet/control growth ratios were observed in samples exposed to digital screens' light for 300 min (3.71 and 3.95, respectively). These ratios declined in samples exposed to screens' light for durations higher than 300 min. Altogether, these findings show that exposure to short-wavelength visible light emitted from smartphones and tablets can increase the proliferation of *Staphylococcus aureus*. Due to limitations of this study, further studies are needed to shed more light on the dark corners of the effect of digital screens' light on different microorganisms and to verify if these exposures can be linked to acne

pathogenesis.

<https://www.linkedin.com/pulse/exposure-visible-light-emitted-from-smartphones-aureus-smj-mortazavi>

--

Use of Signal-Transduction & Metabolic Pathways to Predict Human Disease Targets from EMF Using in vitro Data in Human Cell Lines

Parham F, Portier CJ, Chang X, Mevissen M. The Use of Signal-Transduction and Metabolic Pathways to Predict Human Disease Targets from Electric and Magnetic Fields Using in vitro Data in Human Cell Lines. *Front Public Health*. 2016 Sep 7;4:193. doi: 10.3389/fpubh.2016.00193. eCollection 2016.

Abstract

Using in vitro data in human cell lines, several research groups have investigated changes in gene expression in cellular systems following exposure to extremely low frequency (ELF) and radiofrequency (RF) electromagnetic fields (EMF). For ELF EMF, we obtained five studies with complete microarray data and three studies with only lists of significantly altered genes. Likewise, for RF EMF, we obtained 13 complete microarray datasets and 5 limited datasets. Plausible linkages between exposure to ELF and RF EMF and human diseases were identified using a three-step process: (a) linking genes associated with classes of human diseases to molecular pathways, (b) linking pathways to ELF and RF EMF microarray data, and (c) identifying associations between human disease and EMF exposures where the pathways are significantly similar. A total of 60 pathways were associated with human diseases, mostly focused on basic cellular functions like JAK-STAT signaling or metabolic functions like xenobiotic metabolism by cytochrome P450 enzymes. ELF EMF datasets were sporadically linked to human diseases, but no clear pattern emerged. Individual datasets showed some linkage to cancer, chemical dependency, metabolic disorders, and neurological disorders. RF EMF datasets were not strongly linked to any disorders but strongly linked to changes in several pathways. Based on these analyses, the most promising area for further research would be to focus on EMF and neurological function and disorders.

Open Access Paper: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5013261/>

--

RF radiation at Stockholm Central Railway Station in Sweden and some medical aspects on public exposure to RF fields

Hardell L, Koppel T, Carlberg M, Ahonen M, Hedendahl L. Radiofrequency radiation at Stockholm Central Railway Station in Sweden and some medical aspects on public exposure to RF fields. *Int J Oncol*. 2016 Aug 12. doi: 10.3892/ijo.2016.3657. [Epub ahead of print]

Abstract

The Stockholm Central Railway Station in Sweden was investigated for public radiofrequency (RF) radiation exposure. The exposimeter EME Spy 200 was used to collect the RF exposure data across the railway station. The exposimeter covers 20 different radiofrequency bands from 88 to 5,850 MHz. In total 1,669 data points were recorded. The median value for total exposure was 921 $\mu\text{W}/\text{m}^2$ (or 0.092 $\mu\text{W}/\text{cm}^2$; 1 $\mu\text{W}/\text{m}^2=0.0001$ $\mu\text{W}/\text{cm}^2$) with some outliers over 95,544 $\mu\text{W}/\text{m}^2$ (6 V/m, upper detection limit). The mean total RF radiation level varied between 2,817 to 4,891 $\mu\text{W}/\text{m}^2$ for each walking round. High mean measurements were obtained for GSM + UMTS 900 downlink varying between 1,165 and 2,075 $\mu\text{W}/\text{m}^2$. High levels were also obtained for UMTS 2100 downlink; 442 to 1,632 $\mu\text{W}/\text{m}^2$. Also LTE 800 downlink, GSM 1800 downlink, and LTE 2600

downlink were in the higher range of measurements. Hot spots were identified, for example close to a wall mounted base station yielding over 95,544 $\mu\text{W}/\text{m}^2$ and thus exceeding the exposimeter's detection limit. Almost all of the total measured levels were above the precautionary target level of 3-6 $\mu\text{W}/\text{m}^2$ as proposed by the BioInitiative Working Group in 2012. That target level was one-tenth of the scientific benchmark providing a safety margin either for children, or chronic exposure conditions. We compare the levels of RF radiation exposures identified in the present study to published scientific results reporting adverse biological effects and health harm at levels equivalent to, or below those measured in this Stockholm Central Railway Station project. It should be noted that these RF radiation levels give transient exposure, since people are generally passing through the areas tested, except for subsets of people who are there for hours each day of work.

<http://www.ncbi.nlm.nih.gov/pu bmed/27633090?dopt=Abstract>

--

Exposure to electromagnetic fields aboard high-speed electric multiple unit trains

Niu D, Zhu F, Qiu R, Niu Q. Exposure to electromagnetic fields aboard high-speed electric multiple unit trains. *J Biol Regul Homeost Agents*. 2016 Jul-Sep;30(3):727-731.

Abstract

High-speed electric multiple unit (EMU) trains generate high-frequency electric fields, low-frequency magnetic fields, and high-frequency wideband electromagnetic emissions when running. Potential human health concerns arise because the electromagnetic disturbances are transmitted mainly into the car body from windows, and from there to passengers and train staff. The transmission amount and amplitude distribution characteristics that dominate electromagnetic field emission need to be studied, and the exposure level of electromagnetic field emission to humans should be measured. We conducted a series of tests of the on board electromagnetic field distribution on several high-speed railway lines. While results showed that exposure was within permitted levels, the possibility of long-term health effects should be investigated.

<https://www.ncbi.nlm.nih.gov/p ubmed/27655489?dopt=Abstract>

--

Tumor-specific frequencies and ocular melanoma

Milham S, Stetzer D. Tumor-specific frequencies and ocular melanoma. *Electromagn Biol Med*. 2016 Aug 23:1-5. [Epub ahead of print]

Abstract

Specific kilohertz frequencies in the environment from variable frequency drives on electric motors at a liquid natural gas compressor and storage station on a natural gas pipeline seem to be associated with the development of a very rare cancer, ocular melanoma, at a high school and in individuals living or working in a neighborhood near the plant. Primary neutral-to-earth oscilloscope voltage waveforms and spectra measured near the high school were nearly identical to the ground voltage 2.3 miles away at the gas pipeline. Peak frequencies of 7440 and 19,980 Hz were found at both places. The electric utility practice of using the earth as a conduit for return currents facilitated this exposure.

Conclusion

We believe that specific kilohertz frequencies in the environment from VFDs on electric motors at a liquid

natural gas plant caused a very rare cancer, OM, in the neighborhood of the plant. The electric utility practice of using the earth as a conduit for return currents facilitated this exposure. Other single cancer clusters should be examined similarly.

<https://www.ncbi.nlm.nih.gov/pubmed/27552371>

--

Review: Weak radiofrequency radiation exposure from mobile phone radiation on plants

Halgamuge MN. Review: Weak radiofrequency radiation exposure from mobile phone radiation on plants. *Electromagn Biol Med*. 2016 Sep 20:1-23. [Epub ahead of print]

Abstract

AIM: The aim of this article was to explore the hypothesis that non-thermal, weak, radiofrequency electromagnetic fields (RF-EMF) have an effect on living plants.

SUBJECT AND METHODS: In this study, we performed an analysis of the data extracted from the 45 peer-reviewed scientific publications (1996-2016) describing 169 experimental observations to detect the physiological and morphological changes in plants due to the non-thermal RF-EMF effects from mobile phone radiation. Twenty-nine different species of plants were considered in this work.

RESULTS: Our analysis demonstrates that the data from a substantial amount of the studies on RF-EMFs from mobile phones show physiological and/or morphological effects (89.9%, $p < 0.001$). Additionally, our analysis of the results from these reported studies demonstrates that the maize, roselle, pea, fenugreek, duckweeds, tomato, onions and mungbean plants seem to be very sensitive to RF-EMFs. Our findings also suggest that plants seem to be more responsive to certain frequencies, especially the frequencies between (i) 800 and 1500 MHz ($p < 0.0001$), (ii) 1500 and 2400 MHz ($p < 0.0001$) and (iii) 3500 and 8000 MHz ($p = 0.0161$).

CONCLUSION: The available literature on the effect of RF-EMFs on plants to date observed the significant trend of radiofrequency radiation influence on plants. Hence, this study provides new evidence supporting our hypothesis. Nonetheless, this endorses the need for more experiments to observe the effects of RF-EMFs, especially for the longer exposure durations, using the whole organisms. The above observation agrees with our earlier study, in that it supported that it is not a well-grounded method to characterize biological effects without considering the exposure duration. Nevertheless, none of these findings can be directly associated with human; however, on the other hand, this cannot be excluded, as it can impact the human welfare and health, either directly or indirectly, due to their complexity and varied effects (calcium metabolism, stress proteins, etc.). This study should be useful as a reference for researchers conducting epidemiological studies and the long-term experiments, using whole organisms, to observe the effects of RF-EMFs.

<http://www.ncbi.nlm.nih.gov/pubmed/27650031?dopt=Abstract>

Excerpt

... our review shows that there is a substantial amount of studies which indicate that plants have experienced physiological or morphological changes due to radiofrequency radiation and show statistically significant changes for the short-term exposure duration (up to 13 weeks). In contrast, the results obtained from the long-term exposure studies (two publications using nine different exposures with exposure duration between 3 months to 6 years) support no physiological effects on plants when exposed to radiofrequency radiation from mobile phone radiation. This would bring a remarkable point to the discussion about the apparent absence of response to the long-term exposure that may be interpreted as adaptations. On the other hand, phenotypic

plasticity of plants will permit them to change their structure and function; hence, plants to adapt to environmental change (Nicotra et al., 2010). Plants are naturally affected by environmental stresses due to their immobility. Plants could respond to the environmental factors of wind, rain, electric field and ultraviolet radiation and adjust its physiological condition to adapt to the change of environment (Braam and Davis, 1990; Braam et al., 1996; Mary and Braam, 1997) our previous findings (Halgamuge et al., 2015) indicate that the biological effects considerably relied on field strength and amplitude modulation of the applied field.

--

Effects of Long Term Exposure of 900-1800 MHz Radiation Emitted from 2G Mobile Phone on Mice Hippocampus- A Histomorphometric Study

Mugunthan N, Shanmugasamy K, Anbalagan J, Rajanarayanan S, Meenachi S. Effects of Long Term Exposure of 900-1800 MHz Radiation Emitted from 2G Mobile Phone on Mice Hippocampus- A Histomorphometric Study. J Clin Diagn Res. 2016 Aug;10(8):AF01-6. doi: 10.7860/JCDR/2016/21630.8368. Epub 2016 Aug 1.

Abstract

INTRODUCTION: The advancement in the telecommunications technology with multi-functional added features in mobile phone, attracts more users of all age group. It is alarming to note that, the mobile phone use has increased amongst children and they are exposed to potentially harmful radiofrequency radiation in their lifetime.

AIM: To investigate the long term exposure of 900 to 1800 MHz radiations emitted from 2G mobile phone in mice hippocampus at histomorphometric level.

MATERIALS AND METHODS: With due approval from institutional animal ethics committee, 36 mice were exposed to 2G mobile phone radiation, 48 minutes per day for a period of 30-180 days. The control group was kept under similar conditions without 2G exposure. Mice were sacrificed and the brain was removed from the first month to six months period. Brain was removed from the cranial cavity and hippocampus region was dissected out carefully and processed for routine histological study. Random serial sections were analysed under microscope for histomorphometric changes. For statistical analysis, independent t-test was used for comparing control and 2G exposed groups.

RESULTS: The mean density of neurons in the hippocampus regions CA1, CA2 and DGDB from first to sixth month was significantly lower in the 2G exposed groups; however, in CA3 and DGVB, the 2G exposed mice showed significantly higher density of neurons. The mean nuclear diameter of neurons in the hippocampus region of CA1, CA2, CA3, DGDB and DGVB from first to sixth months showed lower nuclear diameter in 2G exposed mice.

CONCLUSION: The long term exposure to 900-1800 MHz frequency radiations emitted from 2G mobile phone could cause significantly reduced neuron density and decreased nuclear diameter in the hippocampus neurons of mice.

<https://www.ncbi.nlm.nih.gov/pubmed/27656427?dopt=Abstract>

--

Effects of radiofrequency field exposure on glutamate-induced oxidative stress in mouse hippocampal HT22 cells

Kim JY, Kim HJ, Kim N, Kwon JH, Park MJ. Effects of radiofrequency field exposure on glutamate-induced

oxidative stress in mouse hippocampal HT22 cells. *Int J Radiat Biol.* 2016 Sep 20;1-22. [Epub ahead of print]

Abstract

PURPOSE: To define the impact of radiofrequency (RF) under in vitro experimental Alzheimer's disease conditions, we investigated the effect of RF radiation on glutamate-induced oxidative stress in mouse hippocampal neuronal HT22 cells.

MATERIALS AND METHODS: Cell survival rate was measured by MTT and trypan blue exclusion assays. Cell cycle distribution, cell death, and ROS production were analyzed using flow cytometry. Expression of proteins was analyzed by Western blot.

RESULTS: RF exposure alone had a marginal impact on cell proliferation, however significantly enhanced glutamate-induced cytotoxicity in HT22 cells. Glutamate augmented the subG1 fraction of cell cycle, annexin/propidium iodide positive cell population, and expression of cleaved poly (ADP ribose) polymerase, which were further increased by RF exposure. Glutamate induced reactive oxygen species (ROS) generation and RF exposure further upregulated it. N-acetylcysteine (NAC) treatment completely abrogated glutamate- and RF-induced ROS production followed by cell death and restored cell proliferation in HT22 cells. Finally, glutamate phosphorylated c-Jun N-terminal kinase (JNK) and RF increased this event further. Treatment with NAC and inhibitor of JNK decreased JNK phosphorylation and restored cell proliferation, respectively.

CONCLUSIONS: Our results demonstrate that RF exposure enhanced glutamate-induced cytotoxicity by further increase of ROS production in HT22 cells.

<http://www.ncbi.nlm.nih.gov/pu/bmed/27648632?dopt=Abstract>

--

Adverse effects in lumbar spinal cord morphology and tissue biochemistry in Sprague Dawley male rats following exposure to a continuous 1-h a day 900-MHz electromagnetic field throughout adolescence

Kerimoğlu G, Aslan A, Baş O, Çolakoğlu S, Odacı E. Adverse effects in lumbar spinal cord morphology and tissue biochemistry in Sprague Dawley male rats following exposure to a continuous 1-h a day 900-MHz electromagnetic field throughout adolescence. *J Chem Neuroanat.* 2016 Sep 17. pii: S0891-0618(16)30135-1. doi: 10.1016/j.jchemneu.2016.09.007 . [Epub ahead of print]

Abstract

Cell phones, an indispensable element of daily life, are today used at almost addictive levels by adolescents. Adolescents are therefore becoming increasingly exposed to the effect of the electromagnetic field (EMF) emitted by cell phones. The purpose of this study was to investigate the effect of exposure to a 900-MHz EMF throughout adolescence on the lumbar spinal cord using histopathological, immunohistochemical and biochemical techniques. Twenty-four Sprague Dawley (28.3-43.9g) aged 21days were included in the study. These were divided equally into three groups - control (CG), sham (SG) and electromagnetic (ELMAG). No procedure was performed on the CG rats until the end of the study. SG and ELMAG rats were kept inside an EMF cage (EMFC) for 1h a day every day at the same time between postnatal days 22 and 60. During this time, ELMAG rats were exposed to the effect of a 900-MHz EMF, while the SG rats were kept in the EMFC without being exposed to EMF. At the end of the study, the lumbar regions of the spinal cords of all rats in all groups were extracted. Half of each extracted tissue was stored at -80°C for biochemical analysis, while the other half was used for histopathological and immunohistochemical analyses. In terms of histopathology, a lumbar spinal cord with normal morphology was observed in the other groups, while morphological irregularity in gray

matter, increased vacuolization and infiltration of white matter into gray matter were pronounced in the ELMAG rats. The cytoplasm of some neurons in the gray matter was shrunken and stained dark, and vacuoles were observed in the cytoplasm. The apoptotic index of glia cells and neurons were significantly higher in ELMAG compared to the other groups. Biochemical analysis revealed a significantly increased MDA value in ELMAG compared to CG, while SOD and GSH levels decreased significantly. In conclusion, our study results suggest that continuous exposure to a 900-MHz EMF for 1h a day through all stages of adolescence can result in impairments at both morphological and biochemical levels in the lumbar region spinal cords of Sprague Dawley rats.

<http://www.ncbi.nlm.nih.gov/pubmed/27650207?dopt=Abstract>

--

Exposure of ELF-EMF and RF-EMF Increase the Rate of Glucose Transport and TCA Cycle in Budding Yeast

Lin KW, Yang CJ, Lian HY, Cai P. Exposure of ELF-EMF and RF-EMF Increase the Rate of Glucose Transport and TCA Cycle in Budding Yeast. *Front Microbiol.* 2016 Aug 31;7:1378. doi: 10.3389/fmicb.2016.01378. eCollection 2016.

Abstract

In this study, we investigated the transcriptional response to 50 Hz extremely low frequency electromagnetic field (ELF-EMF) and 2.0 GHz radio frequency electromagnetic field (RF-EMF) exposure by Illumina sequencing technology using budding yeast as the model organism. The transcription levels of 28 genes were upregulated and those of four genes were downregulated under ELF-EMF exposure, while the transcription levels of 29 genes were upregulated and those of 24 genes were downregulated under RF-EMF exposure. After validation by reverse transcription quantitative polymerase chain reaction (RT-qPCR), a concordant direction of change both in differential gene expression (DGE) and RT-qPCR was demonstrated for nine genes under ELF-EMF exposure and for 10 genes under RF-EMF exposure. The RT-qPCR results revealed that ELF-EMF and RF-EMF exposure can upregulate the expression of genes involved in glucose transportation and the tricarboxylic acid (TCA) cycle, but not the glycolysis pathway. Energy metabolism is closely related with the cell response to environmental stress including EMF exposure. Our findings may throw light on the mechanism underlying the biological effects of EMF.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5005349/>

--

Effect of mobile phone radiation on pentylenetetrazole-induced seizure threshold in mice

Kouchaki E, Motaghedifard M, Banafshe HR. Effect of mobile phone radiation on pentylenetetrazole-induced seizure threshold in mice. *Iran J Basic Med Sci.* 2016 Jul;19(7):800-3.

Abstract

OBJECTIVES: Scientific interest in potential mobile phone impact on human brain and performance has significantly increased in recent years. The present study was designed to evaluate the effects of mobile phone radiation on seizure threshold in mice.

MATERIALS AND METHODS: BALB/c male mice were randomly divided into three groups: control, acute,

and chronic mobile phone radiation for 30, 60, and 90 min with frequency 900 to 950 MHz and pulse of 217 Hz. The chronic group received 30 days of radiation, while the acute group received only once. The intravenous infusion of pentylenetetrazole (5 mg/ml) was used to induce seizure signs.

RESULTS: Although acute mobile radiation did not change seizure threshold, chronic radiation decreased the clonic and tonic seizure thresholds significantly.

CONCLUSION: Our data suggests that the continued and prolonged contact with the mobile phone radiation might increase the risk of seizure attacks and should be limited.

<http://www.ncbi.nlm.nih.gov/pu/bmed/27635206?dopt=Abstract>

--

Modification of p21 level and cell cycle distribution by 50 Hz magnetic fields in human SH-SY5Y neuroblastoma cells

Luukkonen J, Höytö A, Sokka M, Liimatainen A, Syväoja J, Juutilainen J, Naarala J. Modification of p21 level and cell cycle distribution by 50 Hz magnetic fields in human SH-SY5Y neuroblastoma cells. *Int J Radiat Biol.* 2016 Sep 20;1-27. [Epub ahead of print]

Abstract

PURPOSE: In our previous studies, exposure to extremely low frequency (ELF) magnetic fields (MFs) altered responses to DNA damage caused by menadione. The aim of this study was to evaluate possible ELF MF induced changes in proteins involved in DNA damage responses and in cell cycle distribution.

MATERIALS AND METHODS: Based on our previous studies, the exposure protocol included pre-exposure of human SH-SY5Y neuroblastoma cells to a 50 Hz, 100 μ T MF for 24 h prior to a 3-h menadione treatment. As DNA damage responses are relatively fast processes, a 1-h menadione treatment was also included in the experiments. The menadione concentrations used were 1, 10, 15, 20, and 25 μ M. Immunoblotting was used to assess the levels of DNA damage response-related proteins (γ -H2AX, Chk1, phospho-Chk1, p21, p27, and p53), while the level of DNA damage was assessed by the alkaline Comet assay. Cell cycle distribution was assayed by SYTOX Green staining followed by flow cytometry analysis.

RESULTS: The main findings in MF-exposed cells were decreased p21 protein level after the 1-h menadione treatment, as well as increased proportion of cells in the G1 phase and decreased proportion of S phase cells after the 3-h menadione treatment. These effects were detectable also in the absence of menadione.

CONCLUSIONS: The results indicate that MF exposure can alter the G1 checkpoint response and that the p21 protein may be involved in early responses to MF exposure.

<http://www.ncbi.nlm.nih.gov/pu/bmed/27646005?dopt=Abstract>

--

The effect of extremely low-frequency magnetic field (50-60 Hz) exposure on spontaneous apoptosis: The results of a meta-analysis

Mansourian M, Marateb HR, Vaseghi G. The effect of extremely low-frequency magnetic field (50-60 Hz) exposure on spontaneous apoptosis: The results of a meta-analysis. *Adv Biomed Res.* 2016 Aug 30;5:141. doi: 10.4103/2277-9175.187375. eCollection 2016.

Abstract

BACKGROUND: This paper is a meta-analysis of the published data from in vitro studies to evaluate whether spontaneous apoptosis might be influenced by extremely low frequency (ELF) magnetic fields (MFs).

MATERIALS AND METHODS: A comprehensive scientific literature search in electronic databases was conducted and studies covering the period 2000-2010 were selected. Then, published studies involving the desired topic were retrieved. The inclusion criteria were percentage of apoptosis in the cells exposed to 50-60 Hz ELF-MFs. The statistical analysis was performed by comprehensive meta-analysis version 2.

RESULTS: The summary measure of association (95% confidence interval) for all 18 effect estimated from 8 studies was 1.18 (1.15, 1.20). Heterogeneity among studies was found. There was no evidence of publication bias for the association between exposure to MF and apoptosis risk.

CONCLUSION: Our meta-analysis provided conclusive data that ELF-MFs can increase apoptosis in cancer and normal cells. Furthermore, there is a possibly individual intensity and time range with maximum created effect according to window effect.

Open Access Paper: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5025908/>

--

Recent Posts on Electromagnetic Radiation Safety

- [Comic Strip: Cell Tower Safety, Industry Profits & Government Negligence](#)
- [EMF Controversies in Neurobiology](#)
- [Cell Tower Health Effects](#)
- [Mobilize: A Film About Cell Phone Radiation](#)
- [Berkeley Cell Phone "Right to Know" Ordinance](#)
- [AirPods: Are Apple's New Wireless Earbuds Safe?](#)
- [iPhone 7 Models: Specific Absorption Rates \(SAR\)](#)
- [Effect of Mobile Phones on Sperm Quality](#)
- [National Toxicology Program Finds Cell Phone Radiation Causes Cancer](#)
- [Electromagnetic Hypersensitivity](#)
- [Wi-Fi in Schools & Other Public Places](#)

--

Joel M. Moskowitz, Ph.D., Director
Center for Family and Community Health
School of Public Health
University of California, Berkeley

Electromagnetic Radiation Safety

Website: <http://www.saferemr.com>
Facebook: <http://www.facebook.com/SaferEMR>
Twitter: @berkeleyprc

--

You received this message because you are subscribed to the Google Groups "emfcontacts" group.